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Are Volatile Coffee Prices Important to Economic Inequality?

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INTERNATIONAL ECONOMIC DEVELOPMENT

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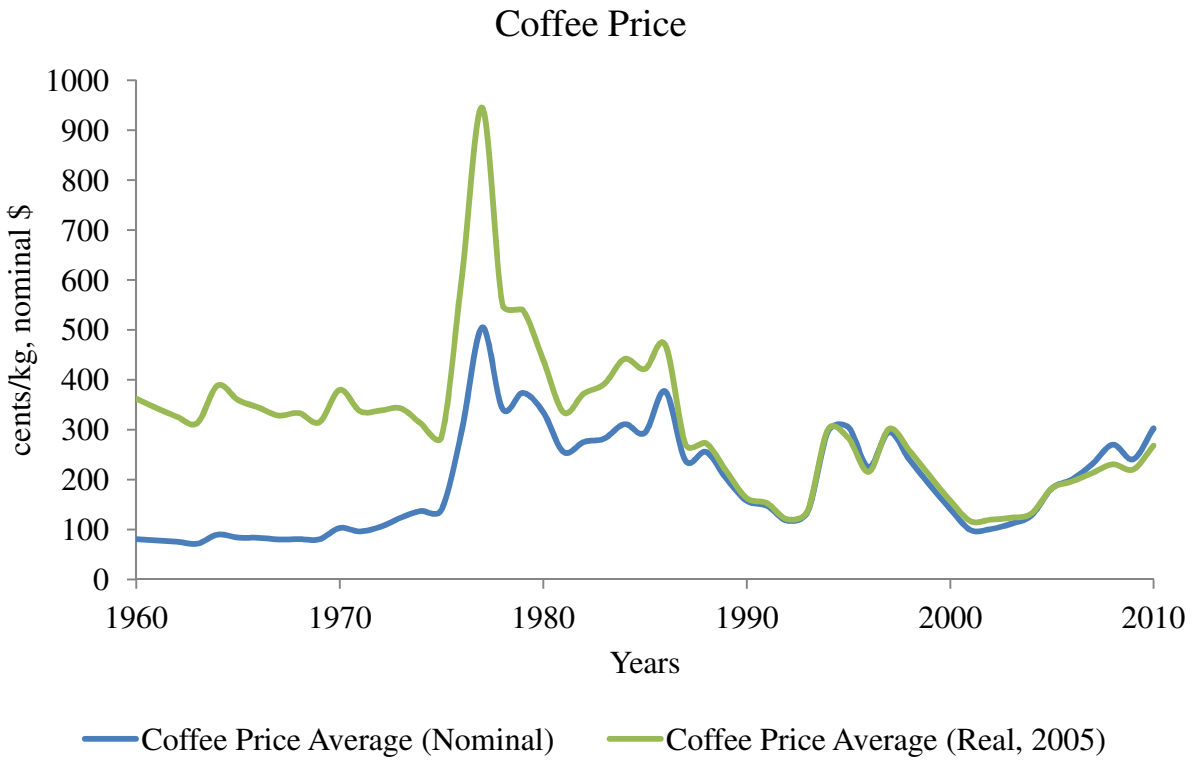

Section I: Introduction

International trade and income inequality have been a hindrance to economic development in most developing countries. Holistically, openness to the global economy might benefit an economy; however, the distribution of the gains from trade is salient to economic development. Most developing countries are well-endowed with natural resources in minerals, such as gold and oil, and agricultural crops, such as coffee, cocoa and palm fruits. Trade in these resources accounts for much of a nation's economic activity. Despite the positive relationship between commodity prices and growth, the dependence on revenue from commodity exports subjects countries to volatile commodity prices from the world market (Figure 1). This paper evaluates how commodity price fluctuations affect income inequality. Countries have evaluated measures to mitigate volatility in the commodity market through policy[1].

Previous empirical research is primarily focused on the effect of commodity prices on economic growth. The agricultural sector is primarily focused in rural areas and the manufacturing sector in urban areas. With lower wages in the agricultural sector, income disparity has been a major source of rural-urban migration. In this paper, I seek to analyze how coffee prices affect income inequality. Annual production of perennial crops is likely to depend on the previous year and might represent a persistent trend in export volumes (Deaton, 1999). In Section II, I present a literature review on commodity price volatility and income inequality. Sections III and IV discuss the theoretical and empirical model respectively, while Section V provides a description of the data. I present and discuss the results of my empirical model in Section VI and conclude in Section VII.

[1] Countries have implemented policies on taxes, exchange rates and trade restrictions to mitigate the negative economic consequences of commodity price fluctuations (Adams, Behrman, & Roldan, 1979)

Section II: Literature Review

Commodity prices affect many developing countries because of their impact on variables such as income and exchange rate. Free trade may boost economic development; however, commodity price volatility is a source of vulnerability. Interestingly, real commodity prices have decreased by 26% (Figure 2) and the absence of a predictable trend increases the challenge of how to maximize gains in a volatile environment. Unfortunately, commodity price forecasting is an arduous task which usually yields inaccurate results. As a result, forecasted prices create uncertainty among policy makers. Post independence, most developing countries specialized in the production and export of primary commodities and imported their manufactured goods (Krueger, 1997). Given their comparative advantage in natural resources, globalization has been advantageous to export economies.

A rise in the value[2] of agricultural exports increases income, foreign exchange earnings, and capital investment, allowing other sectors to develop. As a result, labor tends to shift from the agricultural sector to other industries. A structural decline in the agricultural economy occurs at a slow pace for countries with a comparative advantage in agricultural exports. The decline is dependent on unlikely sizable increases in per capita income (Johnston & Mellor, 1961).

Previous research shows that the state of the economy in developing countries and their exposure to the global market drives commodity prices. (Borensztein & Reinhart, 1994). Even though the value of exports may be significant to a country's economy, price instability in exports is exogenous because most countries are price-takers[3] (Combes & Guillaumont, 2002).

[2] Changes in the value of exports are driven by changes in price and volume of exports.
[3] A country's individual exports may account for a small fraction of global exports with exceptions such as Brazil in the coffee market and Cote d'Ivoire in the cocoa market. As a price taker, a country does not have a significant proportion of global export to create changes in the price of a commodity.

With storable[4] commodities and a floating exchange rate, volatility could be beneficial to producers since they are able to increase supply as price rises and vice versa (Jacks, O'Rourke, & Williamson, 2011). According to Deaton (1999), commodity price growth tends to be a leading indicator of economic growth, but economic policies have found it difficult to diversify and reduce the dependence of an economy on the commodity market.

Price appreciation causes a rise in the value of a commodity export, which creates exchange rate appreciation, making exports expensive to other countries, a phenomenon known as the Dutch disease[5] (Gylfason, 2001). With an undesirable effect on exporters, incomes in the export industry fall due to a decreased demand. As a result, countries have implemented protectionist policies to avoid exchange rate appreciation adversely affecting producers. Although exchange rate appreciation subsidizes foreign capital and increases imports, it hurts rural development, employment and economic growth (Gafar, 1998). The Dutch disease thus raises two questions: (1) "Has the abundance of resources been a gift or a curse to developing countries" and (2) "Should countries trade fewer raw materials or rather bolster other industries in order to experience positive gains from commodities?"

Previous research explains the effects of commodity prices on human capital formation (for example, education and healthcare) in an economy. The government imposes taxes on exports; thus, an increase in price results in an increase in government revenue. Government revenue enables the country to fund expenditure on public goods such as infrastructure, education and healthcare, which are known to reduce income inequality and speed development (Adams, Behrman, & Roldan, 1979). During the American Civil War, Egypt, a major cotton

[4] Storable refers to slowly perishable goods where producers can store output from one season to sell in a later time period.

[5] The term 'Dutch disease' originates from the discovery of oil in the Netherlands during the 1960s which caused an exchange rate appreciation, resulting in a loss in competitiveness for non-oil exports on the global economy.

producer, failed to improve its economy despite higher government revenue from the coffee price boom. Such an example illustrates how the ineptitude of government revenue impedes economic prosperity (Deaton, 1999), which might imply quality of governance rather than price volatility to be a primary cause of a slowdown in development.

Government identities and policies have the ability to hurt or harm the exports of a country. In most countries, the government aims to ensure a healthy economic environment and implement taxation, embargoes, tariffs and subsidies. For example, through the distribution of resource ownership, revenue is likely to be spread out more evenly to reduce income inequality. For example, Indonesians benefited from redistribution in land ownership unlike South Africa, where ownership is concentrated.

Furthermore, wages in economies are affected by international trade; hence, changes in commodity prices might affect the level of inequality of an economy (Burtless, 1995). In the agricultural sector of developing countries, production usually occurs in rural areas and is usually characterized to be labor-intensive. The growth in per capita income is good for an economy; however, a relatively faster growth in the labor-intensive sector is more important to reduce income inequality. For example, in developing countries such as Uganda, coffee is primarily grown by smallholders[6] in the rural world and price booms help reduce poverty (Bussolo, Godart, Lay, & Thiele, 2007). As a result, policy recommendations tend to suggest improvements in the wages in the agricultural sector.

Section III: Theoretical Model

The theory of comparative advantage posits that in trade, a country with a lower opportunity cost of production of a particular commodity will specialize in and trade for goods

[6] Smallholders refer to farmers with relatively small land for cultivation.

whose prices are lower than the importer's opportunity costs. The theoretical framework of this paper shows the effect of commodity prices on returns to factors of production. I use this framework to specify an empirical model relating prices to income inequality.

As a country benefits from the rise in value of its exports, its export economy constitutes a larger proportion of total output, creating economic inequalities between sectors. The notion of economic inequality can be simplified in terms of income inequality. According to the income-expenditure identity, $Income = Consumption + Savings$, the level of an individual's income can have substantial effects on their well-being through changes in consumption and savings.

I use the Hecksher-Ohlin (H-O) model to explain the relationship between international trade and wages (Burtless, 1995). According to the H-O model, a country will export those commodities which are produced with its relatively abundant factors of production and import commodities produced with its scarce resources (Stolper & Samuelson, 1941). This situation derives two theorems: (1) The factor price equalization theorem[7] and, (2) The Stolper-Samuelson theorem.

In this paper, I focus primarily on the Stolper-Samuelson theorem[8] as it explains the impact the price of a commodity has on the wage rate. According to the theorem, a direct relationship between the price of a commodity and the real price of the factor of production is used relatively intensely in producing that commodity (Burtless, 1995). For simplicity, the world price and the domestic price are assumed to be equal, and every country is a price-taker. I relax the assumption that price changes are solely derived from tariffs and protection; thus, regardless of the cause of price volatility, a change in price will reflect the value of exports.

[7] According to the factor price equalization theorem, prices of identical factors of production will equalize across countries as a result of international trade.

[8] Other theories include the Dutch disease and the dual-sector model (Johnston & Mellor, 1961; Goderis & Malone, 2011); however, I do not use these theories as the focus of this paper is on commodity prices and inequality rather than changes in exchange rates and the production process of an economy.

The assumptions of the model are as follows. Only two countries exists, country A and B, and they trade only two commodities, coffee (C) and watches(W). For illustrative purposes, I use coffee and watches to represent the agricultural and manufacturing sectors of the economy respectively. Both countries have a linear production function $C(L_C, K_C)$ and $W(L_W, K_W)$ and a fixed amount of two factors of production: labor $(L)$and capital(K), which accrue wages (w) and rent(r). The total labor to produce C and W are L_C and L_W respectively, hence $L = L_C + L_W$ (1). Similarly, the total capital in producing C and W are K_c and K_W respectively, hence $K = K_C + K_W$ (2). To avoid a transfer of inputs from one commodity to another due to price discrepancies, in equilibrium, the ratio of marginal products[9] for both commodities must remain unchanged in both input markets. This means that $w_w = w_c = w$ (3) and $r_w = r_c = r$ (4).

I assume that the price of a commodity is derived from its marginal cost of production. The price of cotton is $P(C) = rK_C + wL_C$ (5) and the price of watches is $P(W) = rK_W + wL_W$ (6). If $P(C)$ rises and the production of coffee is labor-intensive, wages will rise. Rent should fall for $P(W)$ to remain unchanged, and the change in wages should be larger than the price increase in order to offset the impact of falling rent. In general, the rise in the price of a commodity will raise the return to the more intensively used factor of production in a greater proportion and a decrease in the return of the less intensively used factor of production.

Section IV: Empirical Model

My model is derived from Goderis and Malone's empirical model, which analyzed the effect of resource booms on income inequality (Goderis & Malone, 2011). In my model, I test

[9] The marginal product is obtained from the first derivative of an output with respect to its input. Mathematically, $\frac{\delta C}{\delta L_C} = w_c, \frac{\delta W}{\delta L_W} = w_w, \frac{\delta C}{\delta K_C} = r_c, \frac{\delta W}{\delta K_W} = r_w$

whether an increase in commodity price causes a decrease in inequality while controlling for other variables.

$$Inequality_i = \alpha(Commodity\ Price) + \beta_1(Exchange\ Rate) + \beta_2(Education_i) + \beta_3(Health) + \beta_4(Government\ ) + \beta_5(Dependency_i) + \epsilon \quad (7)$$

In this model, I measure the dependent variable, inequality using the GINI Index, and for robustness, the ratios of income between the top 10% and the bottom 10% and the top 20% and the bottom 20%. The control factors included in the model are the exchange rate, education, health, government expenditure and export value dependency. Appendix 3, Table 9 offers a summary of the expected signs of the hypothesis tests.

In accordance with the theoretical model, I expect the commodity price to have a negative coefficient. Because, *ceteris paribus*, an increase in the commodity price causes an increase in wages in the agricultural sector thus reducing inequality.

In accordance with the theory of the Dutch disease, the exchange rate in the economy should have a positive coefficient. As the exchange rate of a country rises, exports become relatively expensive and imports cheaper. In the case of developing countries, an increasing exchange rate causes a decrease in revenue to the agricultural sector and an increase in the level of investment to the manufacturing sector.

In the empirical model, I measure education using the primary completion rate or progression to secondary school. Theoretically, I expect education, health and government expenditure to have negative coefficients. As the level of education increases, the supply of skilled labor[10] tends to increase, thus lowering the wage level in the skilled sector. The reduced wages signifies income redistribution and an increase in human capital. An additional measure of

[10] In this paper, considering relatively low levels of education in agricultural sector, skilled labor refers to individuals who have had the ability to complete primary school and/or progressed to secondary school. As a result, skilled and unskilled labor refers to the manufacturing and agricultural sector respectively.

human capital is the health of citizens. I measure the health variable using life expectancy; thus, increases in life expectancy should depict an improvement in the well-being of the population. Furthermore, as the level of government expenditure increases, it will benefit economic development if the government seeks to alleviate poverty and inequality by investing in basic infrastructure and other amenities.

Finally, I include a measure of export dependency to test whether the dependence of a country affects inequality. Two measures of dependency are the value of exports relative to agricultural output and economic output respectively. Although previous research has not tested the relative size of export dependency, I anticipate a negative coefficient under a fixed effects model for countries that rely heavily on commodity exports. This is because, as a perennial crop, prices are more likely to be a source of drastic changes in value rather than the volume of exports.

Section V: Data Description

I use panel data of thirty-eight countries for coffee spanning a period of fifty years (1961-2010) which has a minimum of 291 variables and a maximum of 1900 variables. To account for the importance of coffee to a country's economy, I select countries that over the fifty year time period, coffee production has accounted for an average of 1% of agricultural or economic output. My data can be categorized into two main parts. First at a country level, I analyze the coffee market of countries who export a significant proportion of the domestically produced commodity. For example, from Table 6, in the coffee market, Colombia, Honduras, El Salvador and Costa Rica have over 20% of the value of their exports relative to agricultural output. Additionally, from Table 7, Cote d'Ivoire, Burundi, El Salvador and Uganda have over 5% of

their coffee exports relative to their economy. This will enable me determine how the volatility of the global coffee market will significantly affect countries and its relative impact on their economies. I focus on both the value to GDP and agricultural output as certain countries may have a more diversified economy without a diversified agricultural sector for instance.

With the exclusion of the education, there are differences between all variables which can be measured in alternate ways (Table 2). Despite having similar averages for all countries, (16.83 vs. 19.16) there is more variability in inequality between the top and bottom 20% (standard deviation of 10.18) in comparison to the top and bottom 10% (standard deviation of 3.21). However, for countries in the ASI region, there is greater inequality between the top and bottom 10% in comparison to the top and bottom 20%. I observe that between countries, on average there is more variation in the value of coffee relative to agricultural output in comparison to economic output. Intuitively, this can be an illustration of greater diversity in the economy in comparison to the agricultural sector.

In my research, I have coffee price data for eighteen Sub-Saharan Africa and Oceania countries (SSAC), five Asian countries (ASI) and fifteen Latin America, the Caribbean and Central American countries (LACC). I do combine the LACC due to the proximity of countries as they might have similar characteristics such as climate and/or trade structures among others. I use the regions of countries and the relative size of export dependency as dummy variables.

For very large exporters such as Brazil, Mexico and Cote d'Ivoire, over time, exports as a proportion to GDP has decreased significantly (this decrease is relatively smaller for countries with a smaller market share) whereas, the countries still continue to export similar proportions of total coffee produced. This may be evident of other sectors growing as the economy develops.

On average, African countries export most of their produce (87.24%); however, in comparison to the LACC region (73.90%), African countries have not developed as fast as their Latin American counterparts. Coffee is not a main contributor to the economies of Asian countries despite their higher growth rates. This may reflect the dominance of the service sectors and other commodities in which they may have a greater regional competitive advantage. For most developing countries, I observe a steadying of exchange rates. This might act as an incentive for increased trade as stability is established in the exchange rates between countries.

Section VI: Results and Discussion

In my methodology, I use different measures of inequality namely the GINI Index, the proportion of the highest and lowest earners in the economy using the top and bottom 10% and 20% respectively. To account for the diversity of a country's economy I calculate two different export values. The first gives the proportion of the value of exports relative to agricultural production whereas the second shows the ratio of a country's coffee exports to its gross domestic product. In rural communities where coffee is grown is usually characterized by poor education. I use two measures of education to analyze the proportion of children who graduated from primary school and those who progressed to secondary school. With each model, I iterate between the different combination of education and dependency variables.

To begin with, I use a Hausman test to determine whether a fixed or random effects model[11] at the country level is suitable for each regression. Firstly I estimate an optimal dependent variable as a measure of income inequality. There is a negative relationship between coffee prices and the different measures of income inequality. Similar to Goderis and Malone (2011) such a relationship implies that as price increases the income of coffee producers' increase therefore lowering the level of income inequality. *At the 5% and 10% significant levels, coffee prices have a strong negative effect on income inequality between the top 20% and the bottom 20% in the economy (Appendix 3, Table 10).* Intuitively, the ratio of

[11] Henceforth, I refer to fixed effect models as 'the country level' and random effects models as 'the regional level'.

incomes is measure of income inequality since coffee prices are more directly related to income than the GINI Index which is inclusive of other variables.

Commodity prices are depicted as a leading indicator of economic growth (Deaton, 1999). From the results, by lagging coffee prices by a year, holding all other variables, I observe that a previous year's coffee price has reduces the current year's income inequality by an average of 0.033 units (Table 11). Similar to the perennial nature of coffee, year-on-year prices, although affected by other variables are dependent on each other therefore on average, prices do not change drastically. Using annual data is it possible to conclude that the benefits from price increments do last and extend into the next period. At the country level however, life expectancy increases the level of income inequality in a country.

In the LACC region, at the regional level, an increase in coffee price, education and life expectancy decrease the level of income inequality in an economy (Table 12). Additionally, at the country level, as the economy increases its dependence on the value of coffee output, the level of income inequality decreases; however, an as the exchange rate and the level of government expenditure rises inequality worsens. The LACC includes some of the largest coffee producers such as Brazil and Mexico who have diversified their economies over time and have had a significant influence on the global coffee market.

Interestingly, for countries with less than 10% of their coffee export value relative to agricultural output or 2% of their coffee export value relative to the gross domestic product, government expenditure has a strong positive coefficient at the 1% significant level. This might imply government expenditure to be endogenous to income inequality. Intuitively, government expenditure is likely to increase when the level of income inequality in an economy is high. Additionally, for countries with less than 2% of their coffee export value relative to gross domestic product, I do observe that although a rise in the price of coffee is likely to decrease income inequality[12], as the exchange rate of an economy appreciates and their dependency on coffee exports raises the level of income inequality worsens in the economy.

[12] Due to a small sample size, these results should be interpreted with caution.

Section VII: Conclusion

This paper examines the hypothesis whether coffee prices have a positive effect on income inequality. Although commodity prices evidently reduce income inequality both at the regional and the country level, the export dependence of developing countries makes them subject to possible negative shocks in the price of coffee.

The results shown in this paper are partially consistent with Goderis and Malone (2011). However, it is important to note limitations of this study. With small sample sizes due to inadequate data, the results must be interpreted with caution, despite multiple robustness checks. Additionally, having enough data on a measure of good governance will be a better measure than the level of government expenditure to analyze how policies and the political environment affect income inequality.

Successful policies used in the past include focusing on increasing total factor productivity in order to boost the quality of coffee output. An increase in the value raises the price and creates economic diversification from the economy. Further research can analyze whether similar crops such as cocoa have a similar pattern as the coffee market.

Works Cited

Adams, F. G., Behrman, J. R., & Roldan, R. A. (1979). Measuring the Impact of Primary Commodity Fluctuations on Economic Development: Coffee and Brazil. *American Economic Association* , 164-168.

Borensztein, E., & Reinhart, C. M. (1994). The Macroeconomic Determinants of Commodity Prices. *Staff Papers - International Monetary Fund* , 236-261.

Burtless, G. (1995). International Trade and the Rise in Earnings Inequality. *Journal of Economic Literature* , 800-816.

Bussolo, M., Godart, O., Lay, J., & Thiele, R. (2007). The impact of coffee price changes on rural households in Uganda. *Agricultural Economics* , 293-303.

Combes, J.-L., & Guillaumont, P. (2002). Commodity Price Volatility, Vulnerability and Development. *Development Policy Review* , 25-39.

Deaton, A. (1999). Commodity Prices and Growth in Africa. *The Journal of Economic Perspectives* , 23-40.

Gafar, J. (1998). Growth, Inequality and Poverty in Selected Caribbean and Latin American Countries, with Emphasis on Guyana. *Journal of Latin American Studies* , 591-617.

Goderis, B., & Malone, S. W. (2011). Natural Resource Booms and Inequality: Theory and Evidence. *The Scandanavian Journal of Economics* , 388-417.

Gylfason, T. (2001). Nature, Power, and Growth. *Scottish Journal of Political Economy* .

Jacks, D. S., O'Rourke, K. H., & Williamson, J. G. (2011). Commodity Price Volatility and World Market Intergration since 1700. *The Review of Economics and Statistics* , 200-813.

Johnston, B. F., & Mellor, J. W. (1961). The Role of Agriculture in Economic Development. *American Economic Association* , 566-593.

Krueger, A. O. (1997). Trade Policy and Economic Development: How We Learn. *NBER Working Paper No. 5896* .

Stolper, W. F., & Samuelson, P. A. (1941). Protection and Real Wages. *The Review of Economic Studies* , 58-73.

Appendix 1: Summary Statistics

ASI	LACC	SSA
Kuwait	Venezuela, RB	Congo, Rep.
Indonesia	Panama	Zimbabwe
Lao PDR	Jamaica	Guinea
Vietnam	Mexico	Congo, Dem. Rep.
Timor-Leste	Bolivia	Sierra Leone
	Peru	Liberia
	Dominican Republic	Tanzania
	Brazil	Togo
	Ecuador	Central African Republic
	Colombia	Madagascar
	Guatemala	Ethiopia
	Nicaragua	Cameroon
	Honduras	Kenya
	Costa Rica	Rwanda
	El Salvador	Papua New Guinea
		Cote d'Ivoire
		Burundi
		Uganda
5 Countries	15 Countries	18 Countries

Table 1: Countries

All Countries	Observations	Mean	Standard Deviation	Minimum	Maximum
Coffee Export Value/Agricultural Output	1532	0.09	0.10	0.00	0.62
Coffee Export Value/GDP	1721	0.02	0.03	0.00	0.27
Progression to Secondary School (%)	646	64.25	26.47	5.66	99.41
Primary Completion Rate (% of relevant age group)	877	64.45	25.23	5.56	123.40
Life Expectancy	1900	56.07	11.02	26.82	79.19
Government Expenditure	387	20.32	13.02	0.18	209.85
Exchange Rate	1862	605.35	2,401.69	0.00	25,000.00
GINI Index	291	49.25	8.18	28.90	63.30
Income Share Ratio (Highest 10%: Lowest 10%)	291	19.16	3.21	8.47	25.58
Income Share Ratio (Highest 20%: Lowest 20%)	291	16.83	10.18	4.01	79.41

Table 2: Summary Statistics – All Countries

ASI	Observations	Mean	Standard Deviation	Minimum	Maximum
Coffee Export Value/Agricultural Output	132	0.03	0.05	0.00	0.42
Coffee Export Value/GDP	157	0.01	0.01	0.00	0.03
Progression to Secondary School (%)	68	78.85	20.30	13.94	99.41
Primary Completion Rate (% of relevant age group)	94	80.84	19.41	41.30	115.13
Life Expectancy	250	57.72	11.58	32.81	74.83
Government Expenditure	42	29.45	32.54	9.50	209.85
Exchange Rate	220	2,608.13	4,696.17	0.27	18,612.92
GINI Index	20	33.27	3.31	28.99	39.52
Income Share Ratio (Highest 10%: Lowest 10%)	20	13.73	1.06	12.31	15.66
Income Share Ratio (Highest 20%: Lowest 20%)	20	5.11	0.88	4.06	6.98

Table 3: Summary Statistics – Asia

SSAC	Observations	Mean	Standard Deviation	Minimum	Maximum
Coffee Export Value/Agricultural Output	769	0.08	0.08	0.00	0.53
Coffee Export Value/GDP	817	0.03	0.03	0.00	0.27
Progression to Secondary School (%)	282	43.00	22.63	5.66	91.20
Primary Completion Rate (% of relevant age group)	384	46.25	18.99	5.56	123.40
Life Expectancy	900	48.21	6.40	26.82	66.47
Government Expenditure	169	18.38	7.42	0.18	38.10
Exchange Rate	896	328.82	609.12	0.00	5,726.07
GINI Index	57	42.24	6.71	28.90	61.33
Income Share Ratio (Highest 10%: Lowest 10%)	57	16.85	2.77	12.29	23.94
Income Share Ratio (Highest 20%: Lowest 20%)	57	8.99	4.37	4.01	32.65

Table 4: Summary Statistics – Sub – Saharan Africa

LACC	Observations	Mean	Standard Deviation	Minimum	Maximum
Coffee Export Value/Agricultural Output	631	0.12	0.12	0.00	0.62
Coffee Export Value/GDP	747	0.02	0.03	0.00	0.21
Progression to Secondary School (%)	296	81.14	13.54	37.19	98.52
Primary Completion Rate (% of relevant age group)	399	78.11	19.89	23.88	115.10
Life Expectancy	750	64.96	7.72	42.96	79.19
Government Expenditure	176	20.00	7.00	7.56	65.23
Exchange Rate	746	346.86	2,477.20	0.00	25,000.00
GINI Index	214	52.61	5.47	34.42	63.30
Income Share Ratio (Highest 10%: Lowest 10%)	214	20.28	2.54	8.47	25.58
Income Share Ratio (Highest 20%: Lowest 20%)	214	20.01	9.82	5.04	79.41

Table 5: Summary Statistics – Latin America, Central America and the Caribbean

<10%	>10% & <20%	>20%
Zimbabwe	Kenya	Colombia
Venezuela, RB	Papua New Guinea	Honduras
Bolivia	Burundi	El Salvador
Congo, Rep.	Uganda	Costa Rica
Lao PDR	Guatemala	
Indonesia	Nicaragua	
Guinea	Cote d'Ivoire	
Mexico		
Panama		
Tanzania		
Congo, Dem. Rep.		
Sierra Leone		
Liberia		
Kuwait		
Jamaica		
Togo		
Central African Republic		
Dominican Republic		
Ethiopia		
Vietnam		
Peru		
Rwanda		
Ecuador		
Madagascar		
Cameroon		
Brazil		
26 Countries	7 Countries	4 Countries

Table 6: Average ratio of the value of coffee exports to agricultural output from 1961-2010

<2%	>2% & <5%	>5%
Kuwait	Timor-Leste	Cote d'Ivoire
Venezuela, RB	Central African Republic	Burundi
Congo, Rep.	Madagascar	El Salvador
Zimbabwe	Ethiopia	Uganda
Panama	Cameroon	
Jamaica	Kenya	
Mexico	Rwanda	
Bolivia	Papua New Guinea	
Guinea	Colombia	
Indonesia	Guatemala	
Peru	Nicaragua	
Lao PDR	Honduras	
Congo, Dem. Rep.	Costa Rica	
Brazil		
Liberia		
Tanzania		
Ecuador		
Vietnam		
Togo		
Sierra Leone		
Dominican Republic		
21 Countries	13 Countries	4 Countries

Table 7: Average ratio of the value of coffee exports to GDP from 1961-2010

Appendix 2: Data Source and Commodity Price Graphical Representation

Variable	Data Source
GINI Index	The World Bank
Ratio of Income Share	The World Bank
Export Value of Commodity (current US$)	Food and Agriculture Organization
Agricultural Output (current US$)	The World Bank
Gross Domestic Product (current US$)	The World Bank
Progression to Secondary School	The World Bank
Primary Completion Rate	The World Bank
Life Expectancy	The World Bank
Population	The World Bank
Commodity Price	The World Bank

Table 8: Data Source.

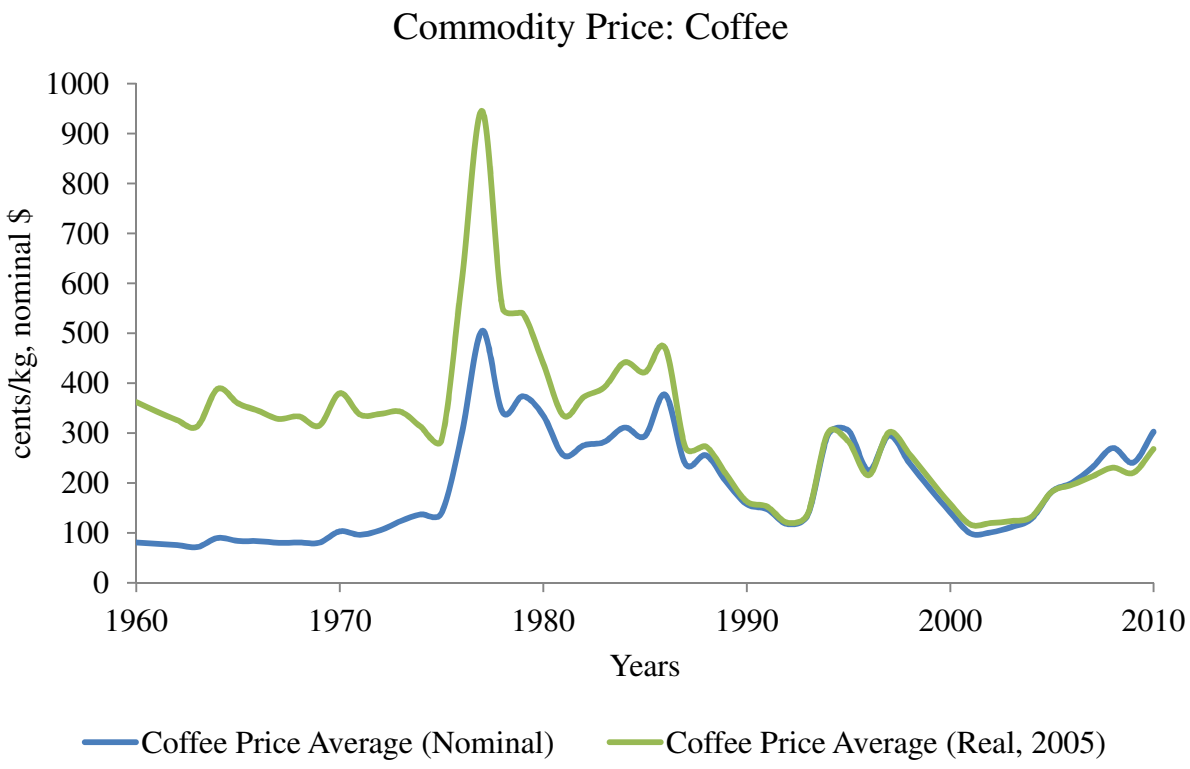

Figure 1: Coffee Prices[13]

[13] The coffee price consists of a weighted average between two main types of coffee beans, namely Arabica and Robusta

Appendix 3: Empirical Model Summary

Variable	Null Hypothesis	Alternative Hypothesis
Commodity Price	$\alpha < 0$	$\alpha > 0$
Exchange Rate	$\beta_1 > 0$	$\beta_1 < 0$
Education	$\beta_2 < 0$	$\beta_2 > 0$
Health	$\beta_3 < 0$	$\beta_3 > 0$
Government Expenditure	$\beta_4 < 0$	$\beta_4 > 0$
Dependency	$\beta_5 => Ambiguous$	$\beta_5 => Ambiguous$

Table 9: Expected Sign of Hypothesis Test

Appendix 4: Results

Independent Variable	RE R20/L20	RE R20/L20	RE R20/L20	FE R20/L20
Coffee Price	-0.029**	-0.023*	-0.026**	-0.003
	(0.013)	(0.012)	(0.012)	(0.018)
Coffee Export Value/Agricultural Output	7.125	23.159		
	(20.150)	(20.131)		
Coffee Export Value/GDP			-34.222	-860.875*
			(104.472)	(430.922)
Progression to Secondary School	0.044		0.024	
	(0.097)		(0.098)	
Primary Completion Rate		0.111		-0.071
		(0.086)		(0.189)
Life Expectancy	0.309	0.220	0.327	0.436
	(0.237)	(0.206)	(0.250)	(0.296)
Government Expenditure	0.247	0.219	0.236	0.327
	(0.170)	(0.177)	(0.169)	(0.315)
Exchange Rate	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-6.515	-8.844	-5.978	-7.012***
	(11.235)	(10.767)	(12.670)	(2.424)
R-Squared	0.354	0.405	0.295	0.017
Observations	70	81	71	57
Number of Countries	22	25	23	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Regression Results

Independent Variable	RE R20/L20	FE R20/L20	RE R20/L20	FE R20/L20
Lagged Coffee Price	-0.037***	-0.031*	-0.034**	-0.030*
	(0.014)	(0.018)	(0.014)	(0.018)
Coffee Export Value/Agricultural Output	3.967	-98.324*		
	(19.504)	(55.598)		
Progression to Secondary School	0.064		0.040	
	(0.097)		(0.098)	
Life Expectancy	0.257	0.579*	0.295	0.519*
	(0.236)	(0.307)	(0.249)	(0.288)
Government Expenditure	0.207	0.316	0.189	0.307
	(0.171)	(0.308)	(0.172)	(0.299)
Exchange Rate	-0.001*	-0.002	-0.001*	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Primary Completion Rate		-0.052		-0.050
		(0.195)		(0.184)
Coffee Export Value/GDP			-19.031	-748.794*
			(105.095)	(392.993)
Constant	-2.417	-13.675***	-3.077	-10.178***
	(11.492)	(2.202)	(12.786)	(2.280)
R-Squared	0.355	0.01	0.313	0.002
Observations	70	56	71	57
Number of Countries	22	16	23	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Robustness Check 1:-Lagged Coffee Price

Independent Variable	RE R20/L20	RE R20/L20	FE R20/L20	FE R20/L20
Coffee Price	-0.030**	-0.027*	0.012	0.002
	(0.014)	(0.015)	(0.016)	(0.018)
Coffee Export Value/Agricultural Output	13.733	33.197		
	(19.247)	(21.191)		
Progression to Secondary School	-0.216*		-0.391*	
	(0.125)		(0.206)	
Life Expectancy	-1.107**	-1.238**	0.718**	0.413
	(0.439)	(0.527)	(0.271)	(0.298)
Government Expenditure	0.167	0.144	0.700***	0.356
	(0.191)	(0.214)	(0.244)	(0.317)
Exchange Rate	0.002	0.002	0.011**	0.009
	(0.002)	(0.002)	(0.004)	(0.007)
Primary Completion Rate		0.236*		-0.073
		(0.127)		(0.189)
Coffee Export Value/GDP			-1,960.337***	-907.760**
			(464.758)	(430.317)
Constant	118.409***	85.481**	-4.139*	-8.240***
	(33.534)	(36.899)	(2.114)	(2.339)
R-Squared	0.551	0.479	0.077	0.021
Observations	57	65	43	51
Number of Countries	14	15	11	12

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Robustness Check 2:-Regional Dummies (LACC)[14]

[14] Due to insufficient data, I was unable to obtain results for the SSAC and ASI regions.

Independent Variable	RE R20/L20	RE R20/L20	RE R20/L20	RE R20/L20
Coffee Price	-0.007	-0.005	-0.008	-0.010
	(0.012)	(0.011)	(0.012)	(0.011)
Coffee Export Value/Agricultural Output	-31.707	-53.428		
	(48.122)	(41.926)		
Progression to Secondary School	-0.068		-0.072	
	(0.133)		(0.134)	
Life Expectancy	0.154	-0.125	0.066	-0.163
	(0.291)	(0.291)	(0.323)	(0.295)
Government Expenditure	0.651***	0.629***	0.651***	0.582***
	(0.190)	(0.169)	(0.190)	(0.171)
Exchange Rate	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.000)	(0.001)	(0.000)
Primary Completion Rate		0.121		0.120
		(0.089)		(0.097)
Coffee Export Value/GDP			-134.538	-38.074
			(247.780)	(220.880)
Constant	1.703	4.751	7.635	7.564
	(17.154)	(14.846)	(19.519)	(15.544)
R-Squared	0.429	0.564	0.453	0.591
Observations	41	49	41	49
Number of Countries	14	16	14	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Robustness Check 3a:-Coffee Export Value/Agricultural Output <10% (Government Expenditure Observation 1)

Independent Variable	RE R20/L20	RE R20/L20	RE R20/L20	RE R20/L20
Coffee Price	-0.006	-0.007	-0.010	-0.005
	(0.013)	(0.013)	(0.012)	(0.012)
Coffee Export Value/Agricultural Output	-30.140			-65.093
	(53.232)			(44.382)
Progression to Secondary School	-0.080	-0.100		
	(0.153)	(0.164)		
Life Expectancy	0.128	0.106	-0.269	-0.219
	(0.402)	(0.402)	(0.296)	(0.288)
Government Expenditure	0.650***	0.657***	0.590***	0.632***
	(0.199)	(0.204)	(0.171)	(0.168)
Exchange Rate	-0.001	-0.001	-0.001	-0.001*
	(0.001)	(0.001)	(0.000)	(0.000)
Primary Completion Rate			0.298**	0.327**
			(0.136)	(0.134)
Coffee Export Value/GDP	-210.404	-141.884		
	(496.086)	(370.476)		
Constant	4.449	7.106	-1.076	-7.126
	(23.979)	(23.592)	(16.137)	(16.087)
R-Squared	0.39	0.404	0.643	0.643
Observations	38	38	45	45
Number of Countries	12	12	14	14

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Robustness Check 3b:-Coffee Export Value/GDP <2% (Government Expenditure Observation 2)

Independent Variable	RE R20/L20	RE R20/L20	RE R20/L20	RE R20/L20
Coffee Price	-0.041**	-0.000	-0.048***	-0.038
	(0.017)	(0.040)	(0.016)	(0.034)
Coffee Export Value/Agricultural Output	55.066**	74.802**		
	(22.309)	(33.598)		
Progression to Secondary School	-0.251		-0.113	
	(0.220)		(0.239)	
Life Expectancy	-0.313	-0.908	0.182	0.081
	(0.456)	(1.074)	(0.445)	(0.561)
Government Expenditure	-0.498	-0.285	-0.612	-0.622
	(0.407)	(0.531)	(0.393)	(0.439)
Exchange Rate	0.005***	0.006	0.005***	0.006**
	(0.001)	(0.004)	(0.001)	(0.003)
Primary Completion Rate		-0.293		0.003
		(0.399)		(0.305)
Coffee Export Value/GDP			515.358***	756.963***
			(181.326)	(107.814)
Constant	73.095**	106.288	28.806	21.113
	(33.840)	(77.990)	(39.892)	(44.008)
R-Squared	0.876	0.818	0.882	0.855
Observations	18	21	18	21
Number of Countries	4	4	4	4

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Robustness Check 4:-Coffee Export Value/GDP <2% (Exchange Rate Observation)